Micro System

MCM204/all version

Service
Service
Service

Service Manual

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CLASS 1
LASER PRODUCT

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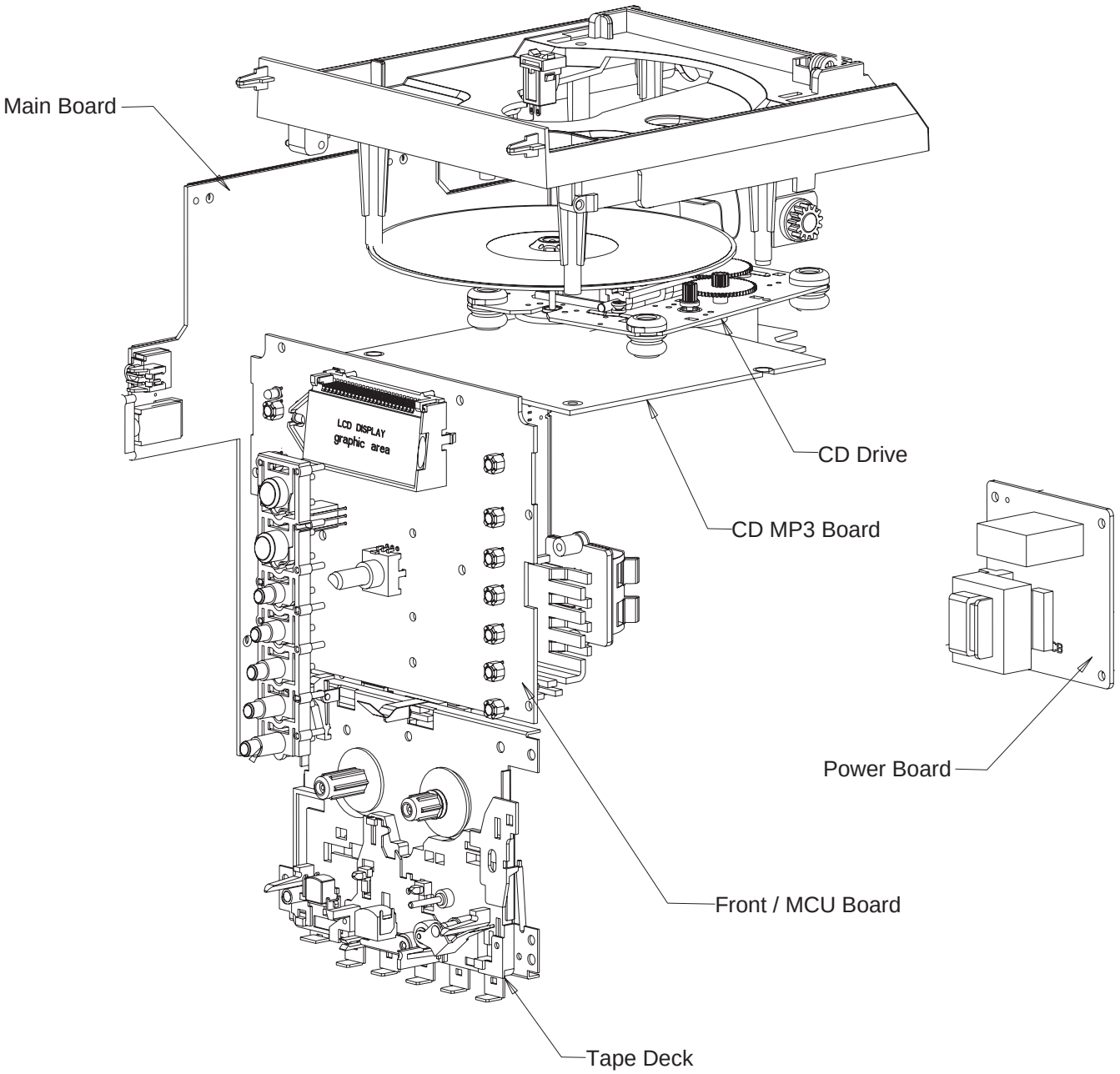
GB 3141 785 31321

Version 1.1

PHILIPS

LOCATION OF PCBs



SPECIFICATIONS

AMPLIFIER

Output power ..... 2 x 4W RMS
Signal-to-noise ratio ..... ≥ 60 dBA (IEC)
Frequency response ..... 125 – 16000 Hz
Impedance loudspeakers 4Ω

CD PLAYER

Frequency range ..... 125 – 16000 Hz
Signal-to-noise ratio ..... 65 dBA

TUNER

FM wave range ..... 87.5 – 108 MHz
MW wave range ..... 531 – 1602 kHz
Sensitivity at 75 Ω
– FM 26 dB sensitivity ..... 20 µV
– MW 26 dB sensitivity ..... 5 mV/m
Total harmonic distortion ..... ≤ 5%

TAPE DECK

Frequency response
Normal tape (type I) ..... 125 – 8000 Hz (8 dB)
Signal-to-noise ratio
Normal tape (type I) ..... 40 dBA
Wow and flutter ..... ≤ 0.4% JIS

SPEAKERS

Bass reflex system
Dimensions (w x h x d) . 146 x 228 x 160 (mm)

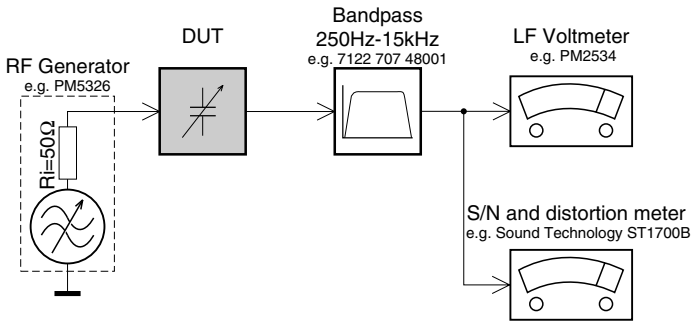
GENERAL INFORMATION

AC Power ..... 220 – 230 V / 50 Hz
Dimensions (w x h x d) ... 146 x 228 x 216(mm)
Weight (with/without speakers) .....
..... approx. 4.4 / 2.0 kg
Power consumption
Active ..... 30 W
Standby ..... < 5 W
Eco Power Standby ..... < 1 W

Specifications and external appearance are subject to change without notice.

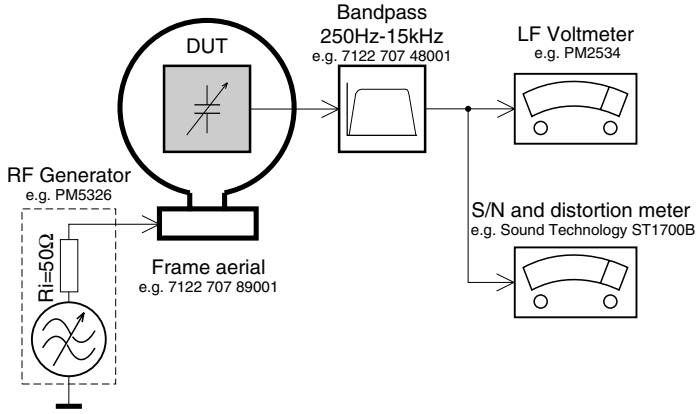
MEASUREMENT SETUP

Tuner FM



Use a bandpass filter to eliminate hum (50Hz, 100Hz) and disturbance from the pilottone (19kHz, 38kHz).

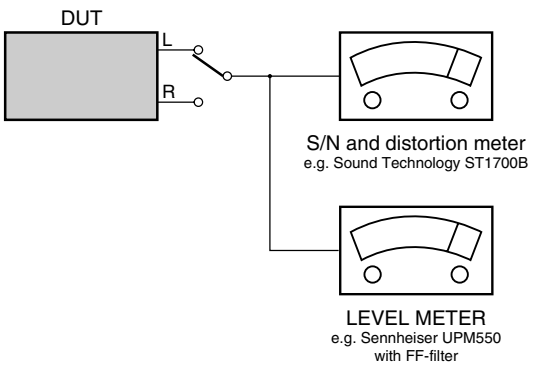
Tuner AM (MW,LW)



To avoid atmospheric interference all AM-measurements have to be carried out in a Faraday´s cage.
Use a bandpass filter (or at least a high pass filter with 250Hz) to eliminate hum (50Hz, 100Hz).

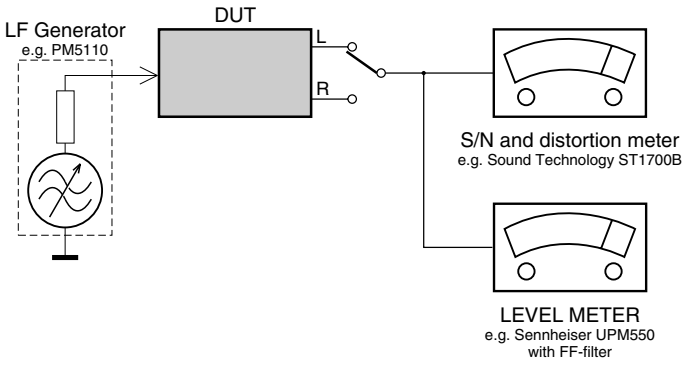
CD

Use Audio Signal Disc SBC429 4822 397 30184
(replaces test disc 3)



Recorder

Use Universal Test Cassette **CrO2** SBC419 4822 397 30069
or Universal Test Cassette **Fe** SBC420 4822 397 30071



SERVICE AIDS

Service Tools:

Universal Torx driver holder 4822 395 91019
Torx bit T10 150mm 4822 395 50456
Torx driver set T6-T20 .....4822 395 50145
Torx driver T10 extended 4822 395 50423

Compact Disc:

SBC426/426A Test disc 5 + 5A 4822 397 30096
SBC442 Audio Burn-in test disc 1kHz 4822 397 30155
SBC429 Audio Signals disc 4822 397 30184
Dolby Pro-logic Test Disc 4822 395 10216

GB **WARNING**

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

ESD

GB

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used

Safety components are marked by the symbol ⚠.

CLASS 1
LASER PRODUCT

INFORMATION ABOUT LEAD-FREE SOLDERING

Philips CE is producing lead-free sets from 1.1.2005 onwards.
IDENTIFICATION:

Regardless of special logo (not always indicated) one must treat all sets from 1 Jan 2005 onwards, according next rules:

- On our website **www.atyourservice.ce.Philips.com** you find more information to:
  - BGA-de-/soldering (+ baking instructions)
  - Heating-profiles of BGAs and other ICs used in Philips-sets
  - Lead free

  You will find this and more technical information within the "magazine", chapter "workshop news".

For additional questions please contact your local repair-helpdesk.

SERVICE INSTRUCTION

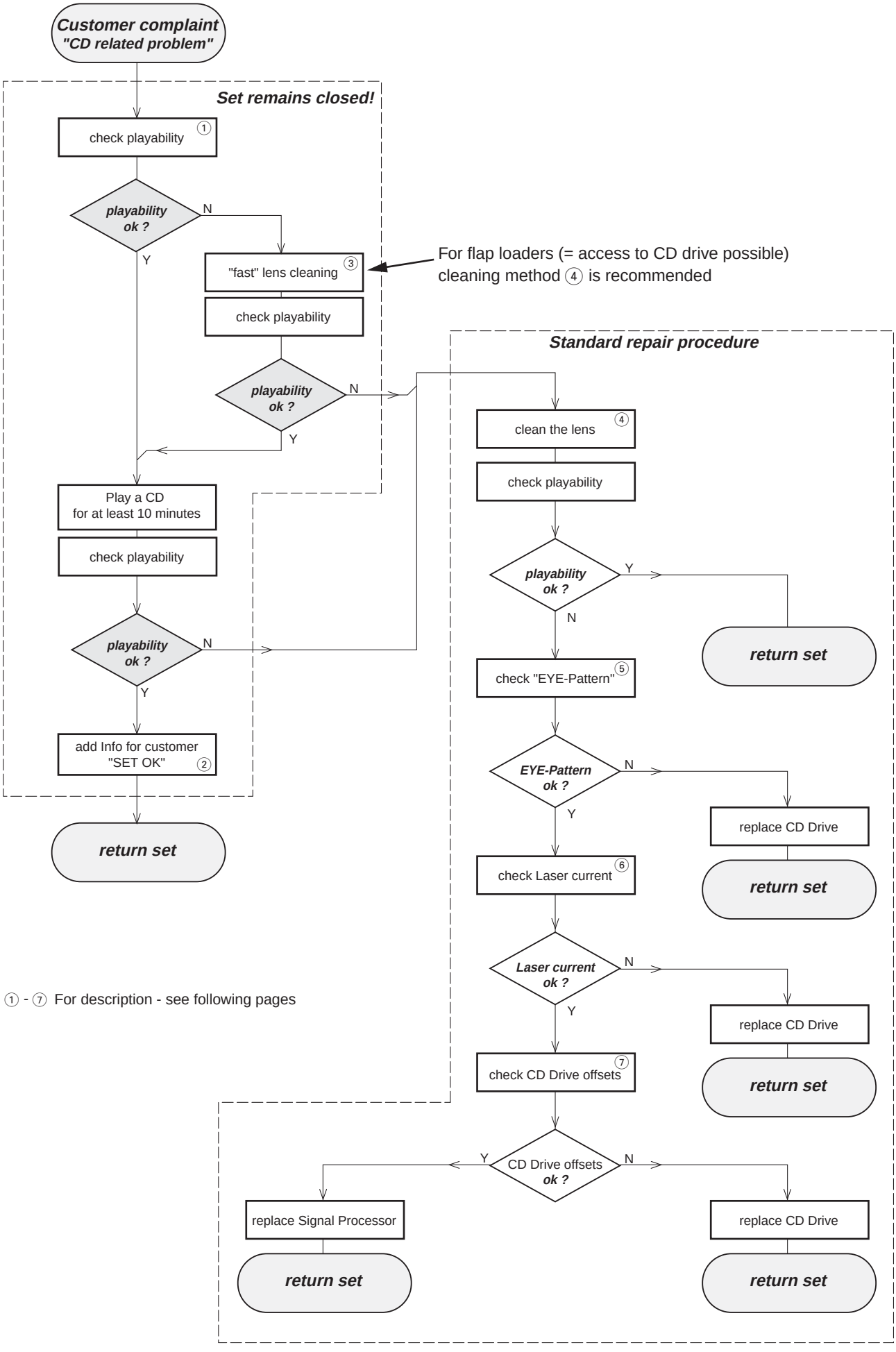
Safety regulations require that after a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the AC Power lead for external damage.
- Check the strain relief of the AC Power cord for proper function.
- Check the electrical DC resistance between the AC Power Plug and the secondary side (only for sets which have a AC Power isolated power supply):

1. Unplug the AC Power cord and connect a wire between the two pins of the AC Power plug.
2. Set the AC Power switch to the "on" position (keep the AC Power cord unplugged!).
3. Measure the resistance value between the pins of the AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be larger than 4.5 Mohm (For U.S. it should be between 4.2 Mohm and 12 Mohm).
4. Switch "off" the set, and remove the wire between the two pins of the AC Power plug.

- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

INSTRUCTIONS ON CD PLAYABILITY



INSTRUCTIONS ON CD PLAYABILITY

①

PLAYABILITY CHECK

For sets which are compatible with **CD-RW** discs
use CD-RW Printed Audio Disc.....7104 099 96611
TR 3 (Fingerprint)
TR 8 (600µ Black dot) **maximum at 01:00**

- playback of these two tracks without audible disturbance
  playing time for: Fingerprint ≥10seconds
  Black dot from 00:50 to 01:10
- jump forward/backward (search) within a reasonable time

For all other sets
use CD-DA SBC 444A.....4822 397 30245
TR 14 (600µ Black dot) **maximum at 01:15**
TR 19 (Fingerprint)
TR 10 (1000µ wedge)

- playback of all these tracks without audible disturbance
  playing time for: 1000µ wedge ≥10seconds
  Fingerprint ≥10seconds
  Black dot from 01:05 to 01:25
- jump forward/backward (search) within a reasonable time

②

CUSTOMER INFORMATION

It is proposed to add an addendum sheet to the set which informs the customer that the set has been checked carefully - but no fault was found.
The problem was obviously caused by a scratched, dirty or copy-protected CD. In case problems remain, the customer is requested to contact the workshop directly.
The lens cleaning (method ③) should be mentioned in the addendum sheet.

The final wording in national language as well as the printing is under responsibility of the Regional Service Organizations.

③

FAST LENS CLEANING (dry brush)

Use lens cleaning CD
SBC AC300.....9082 100 00043

Insert the lens cleaning CD, press PLAY and follow the voice guide´s instructions on the CD.

④

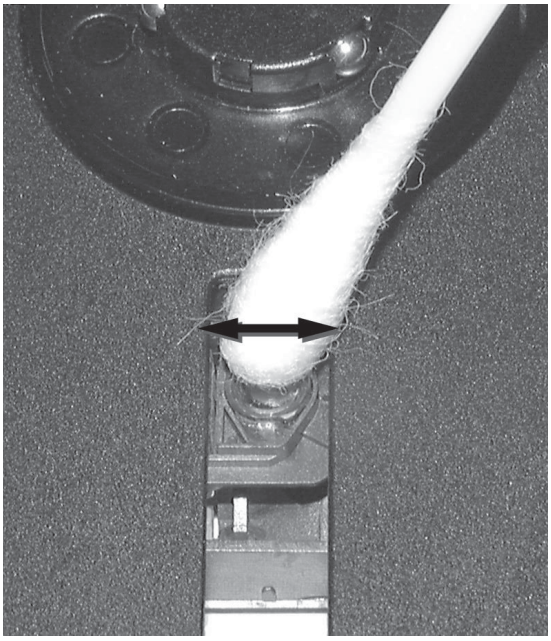
LIQUID LENS CLEANING

Before touching the lens it is advised to clean the surface of the lens by blowing clean air over it. This to avoid that little particles make scratches on the lens.

Because the material of the lens is synthetic and coated with a special anti-reflectivity layer, cleaning must be done with a non-aggressive cleaning fluid. It is advised to use “Cleaning Solvent B4-No2”, available with codenumber 4822 389 10026.

The actuator is a very precise mechanical component and may not be damaged in order to guarantee its full function. Clean the lens gently (don’t press too hard) with a soft and clean cotton bud moistened with the special lens cleaner.

The direction of cleaning must be in the way as indicated in the picture below.

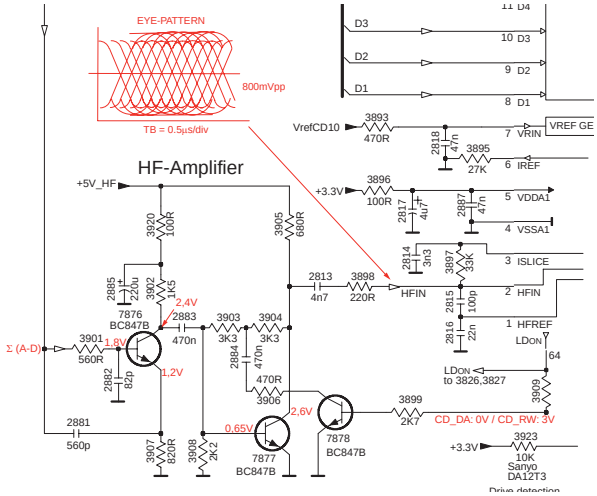


INSTRUCTIONS ON CD PLAYABILITY

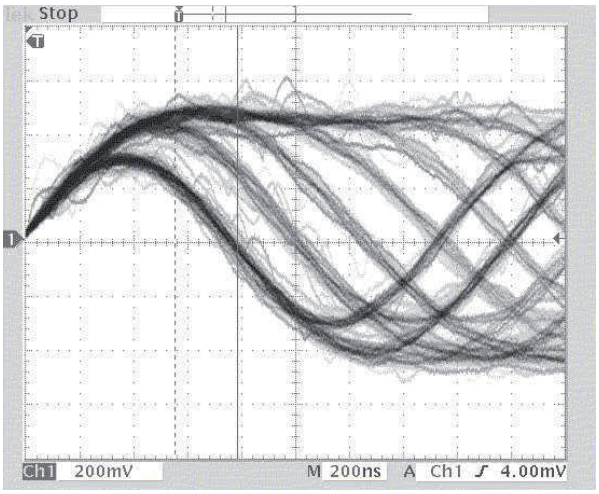
⑤

EYE-PATTERN SIGNAL – JITTER MEASUREMENT

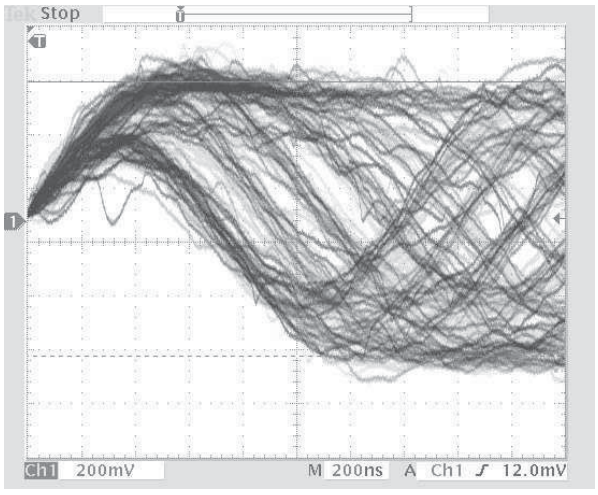
Measure the signal on the input of the Signal processor using an **analog** oscilloscope. Please find the exact measuring point in your Service Manual.



See below examples of the signal. Amplitude should read at least 700mVpp using SBC444A.



good



bad

If the oscilloscope shows a signal like the 'bad' one, and/or the amplitude decreases within 1 minute - the CD drive has to be replaced.

⑥

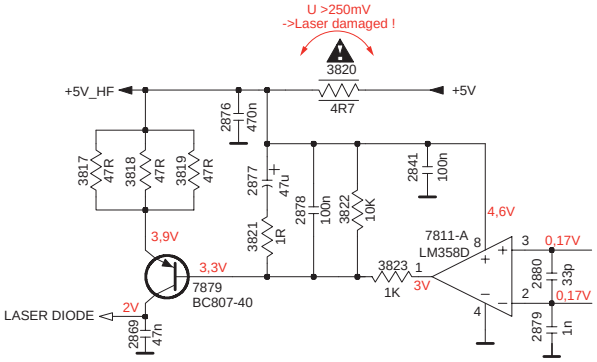
CD DRIVE – LASER CURRENT MEASUREMENT

The laser current can be measured as a voltage drop on a resistor. The resistor is marked in every Service Manual. The value depends on the type of CD drive.

	typical value	most probably defect
VAMxxxx	: 150-230mV	≥350mV
MCDxx	: 170-230mV	≥300mV
DA1x	: 210-250mV	≥350mV
DA2x	: 175-200mV	≥250mV

Use SBC444A (CD-DA) for measurement.

Laser power control



⑦

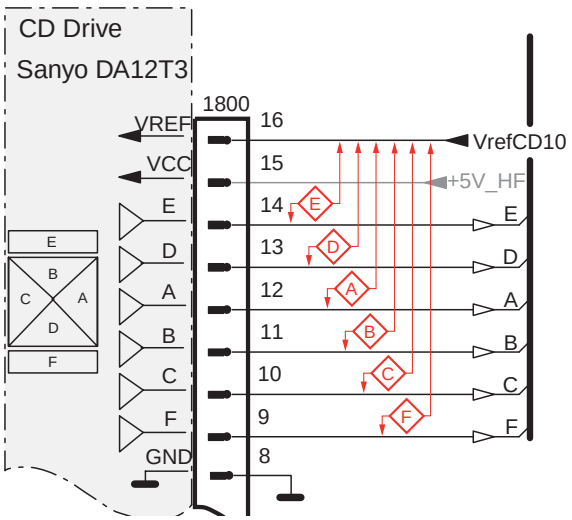
CD DRIVE – OFFSET MEASUREMENT

The photodiodes of the CD-drive may have an offset. These offsets have to be compensated by the signal processor. High offsets can lead to poor playability of some CDs (skipping tracks).

To measure the offset values, start the **Service Test Program** - section "Focus Test" without a CD.

The offsets can be measured with a DC Millivoltmeter directly on the connector (see drawing below). Pin numbering varies from drive to drive.

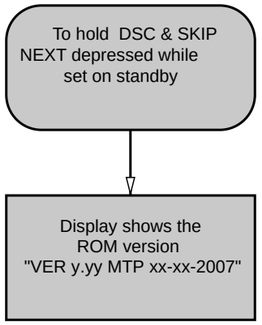
The values from diode A-D should read 0±10mV. Diodes E and F are less critical.



If one of the offsets is higher than ±10mV the CD drive has to be replaced. Otherwise replace the Signal Processor.

2-1

SOFTWARE VERSION CHECKING



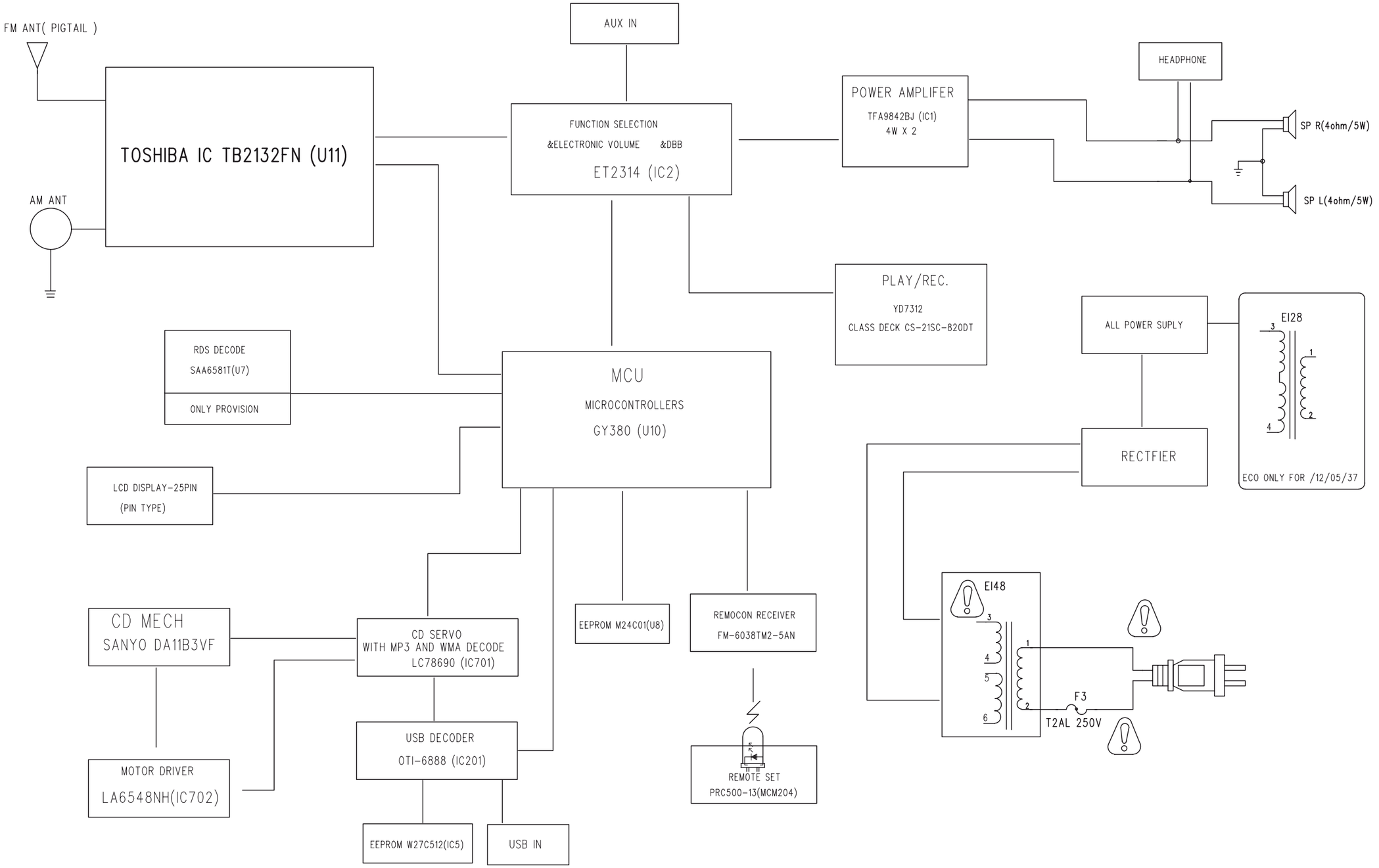
V refers to Version

y.yy refers to Software version number of the uProcessor
(counting up from 01 to 99)

xx refers to date number of the production.

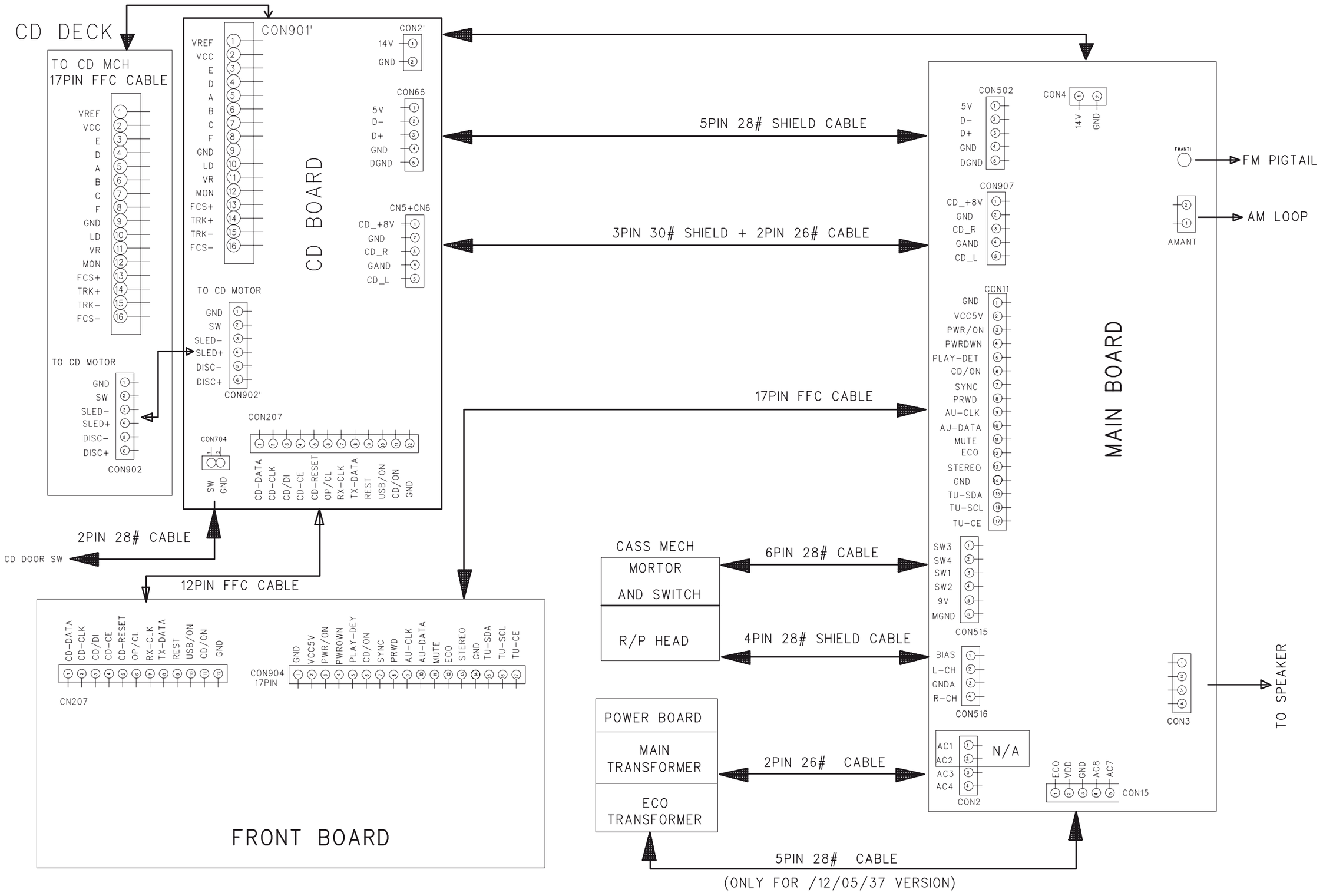
3-1

SET BLOCK DIAGRAM



4-1

SET WIRING DIAGRAM



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MAIN & POWER BOARD

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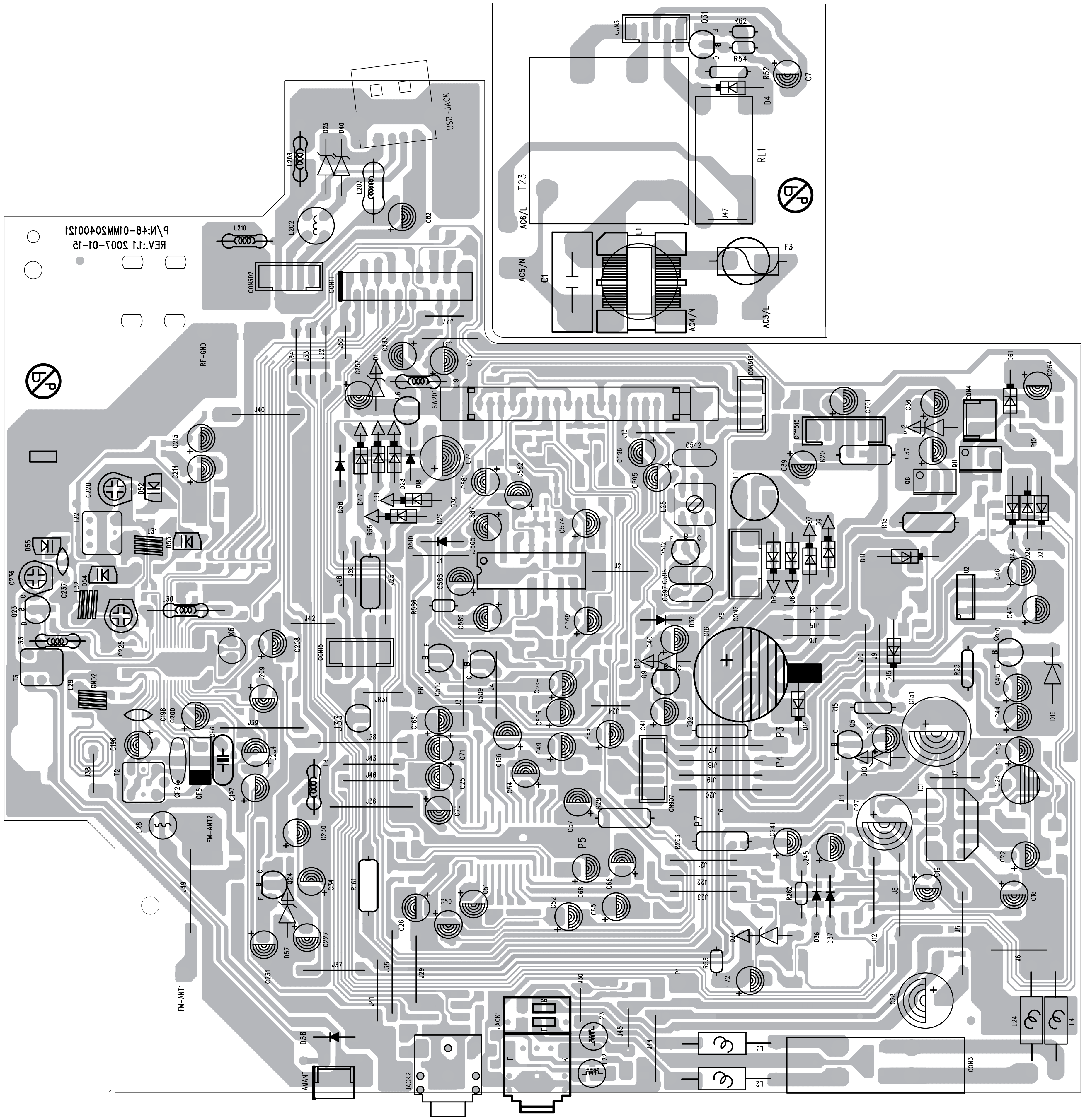
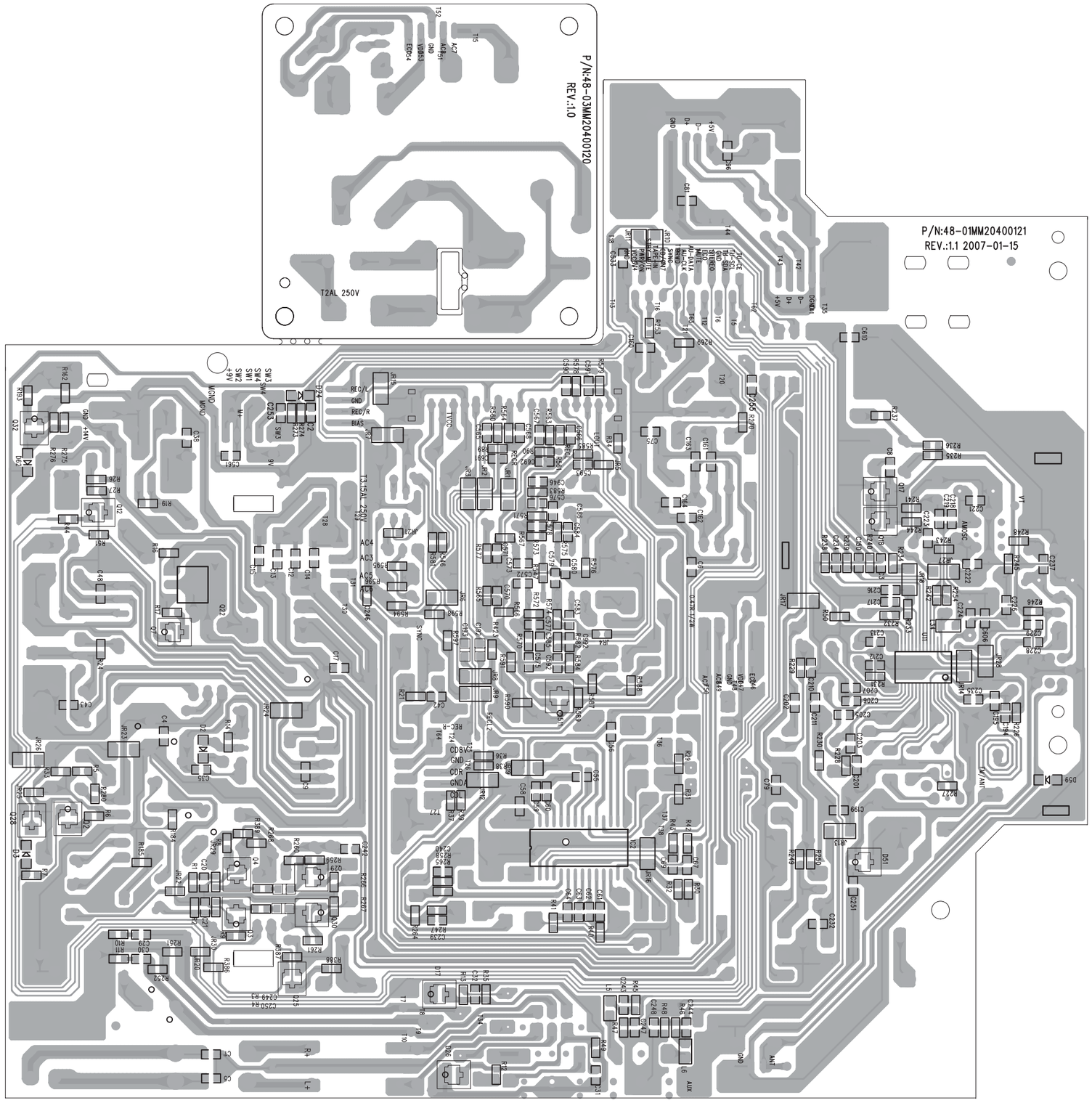
PCB LAYOUT - MAIN & POWER BOARD (TOP VIEW)



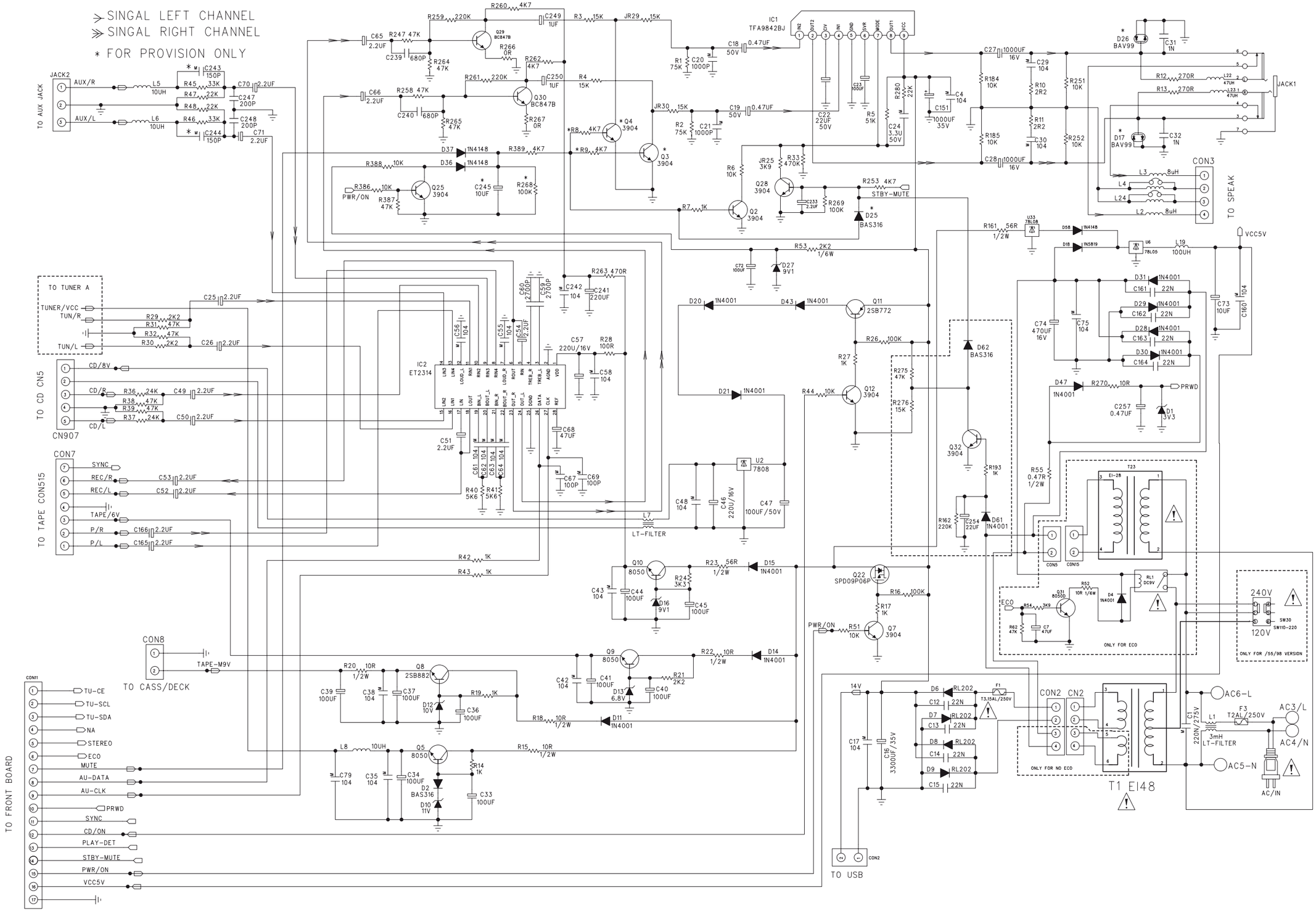
5-3

PCB LAYOUT - MAIN & POWER BOARD (BOTTOM VIEW)



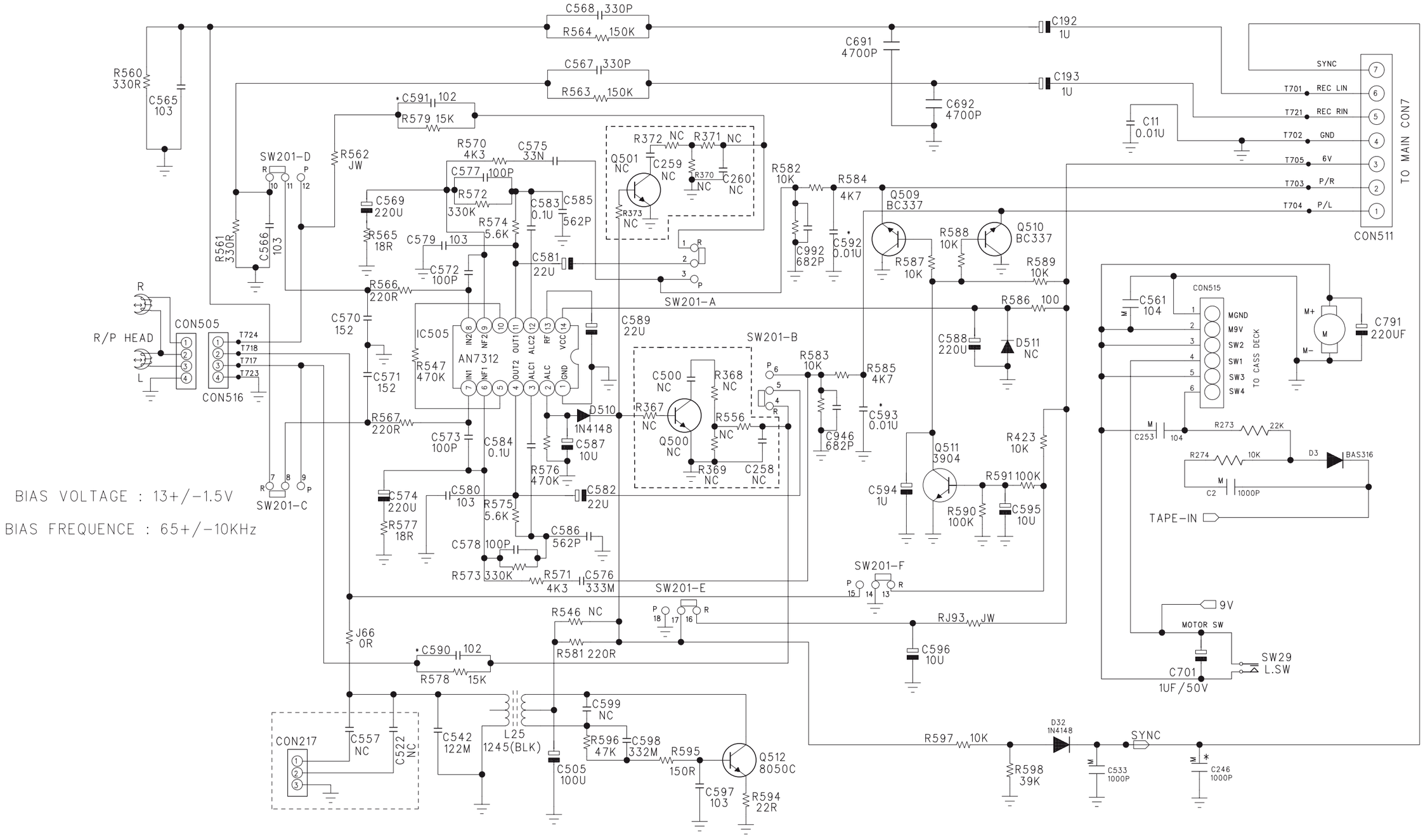
5-4

CIRCUIT DIAGRAM - MAIN & POWER BOARD
AF & POWER PART



5-5

CIRCUIT DIAGRAM - MAIN BOARD
TAPE PART



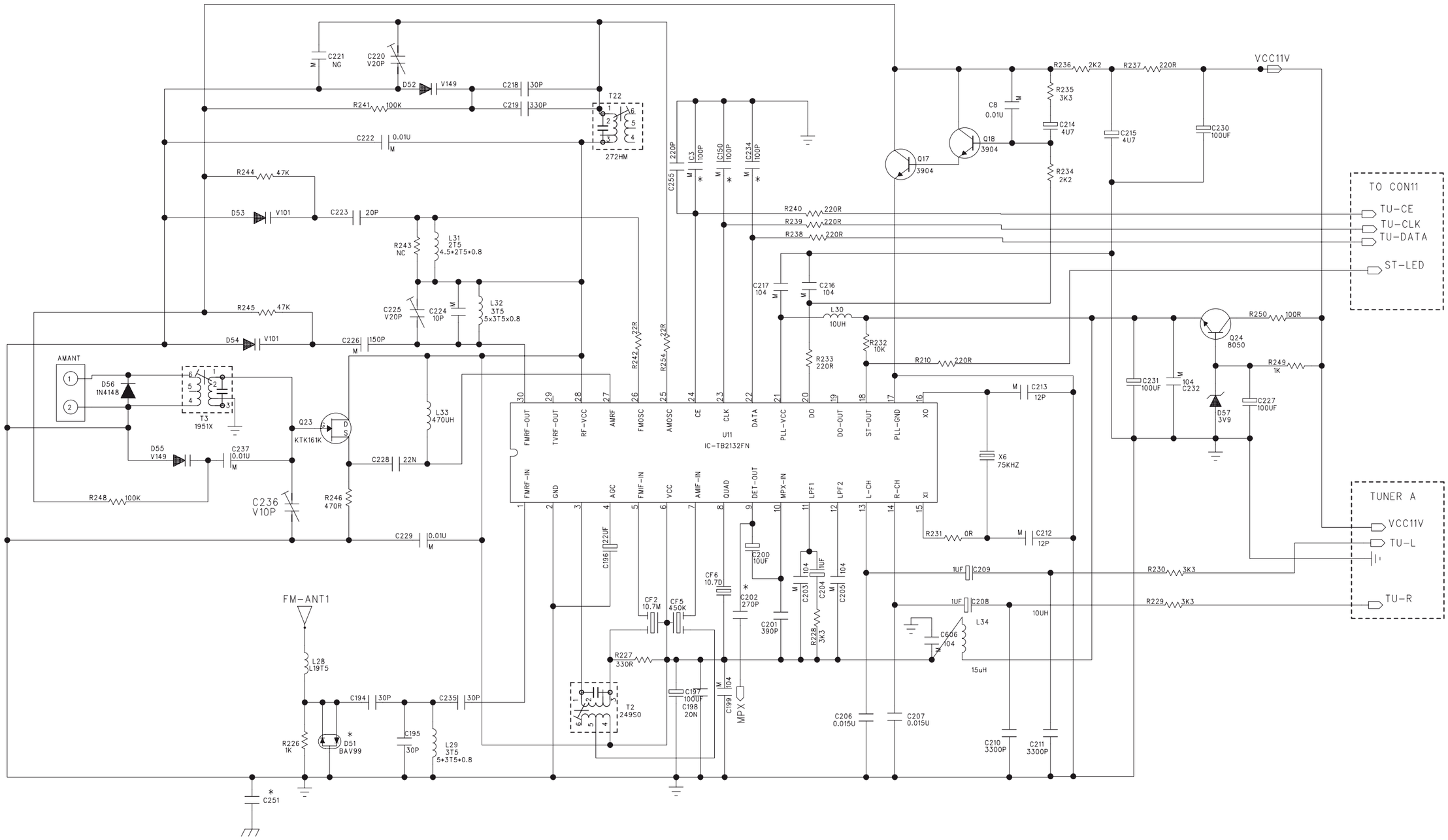
BIAS VOLTAGE : 13+/−1.5V

BIAS FREQUENCE : 65+/−10KHz

* FOR PROVISION ONLY

5-6

CIRCUIT DIAGRAM - MAIN BOARD
TUNER PART



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FRONT/MCU BOARD

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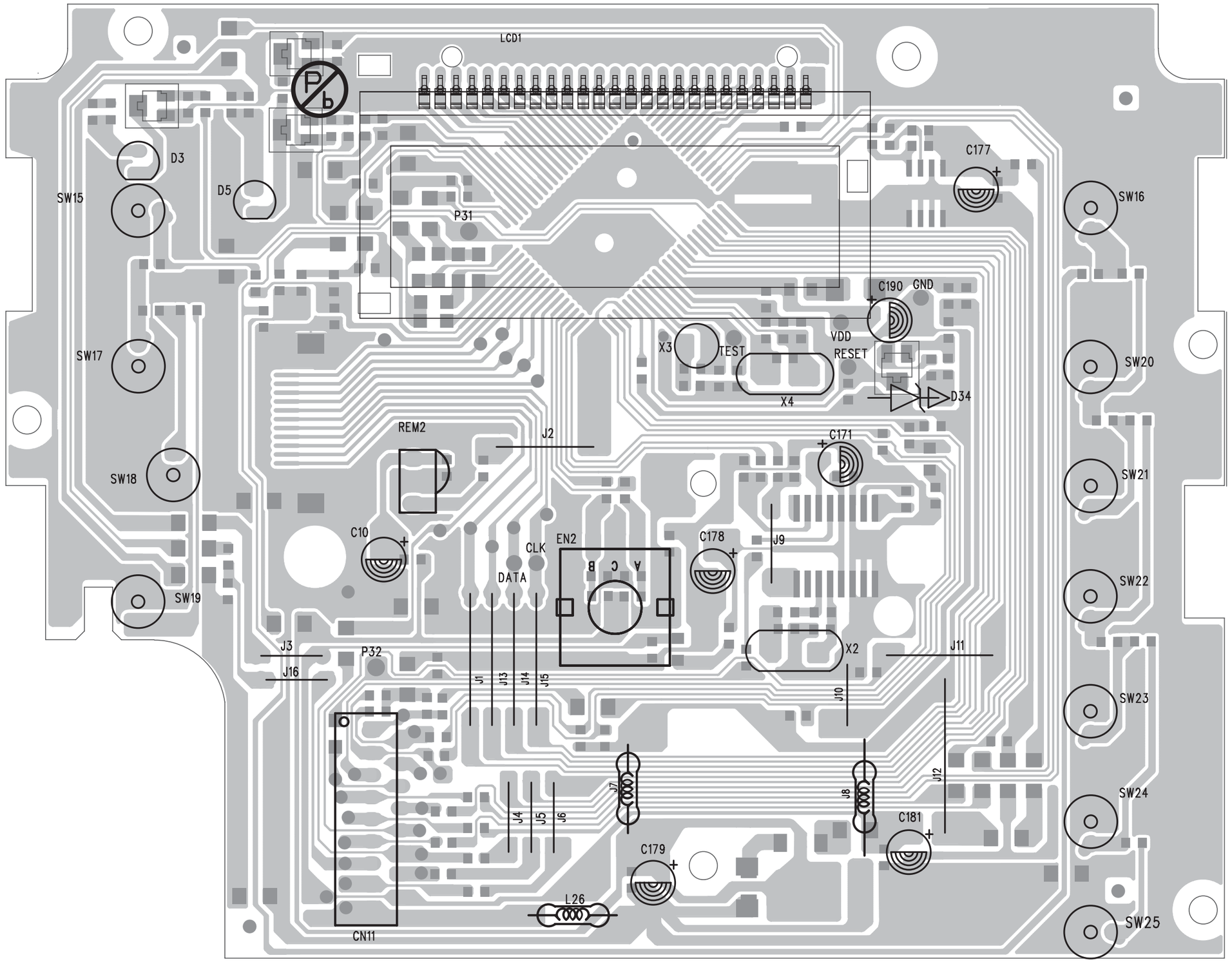
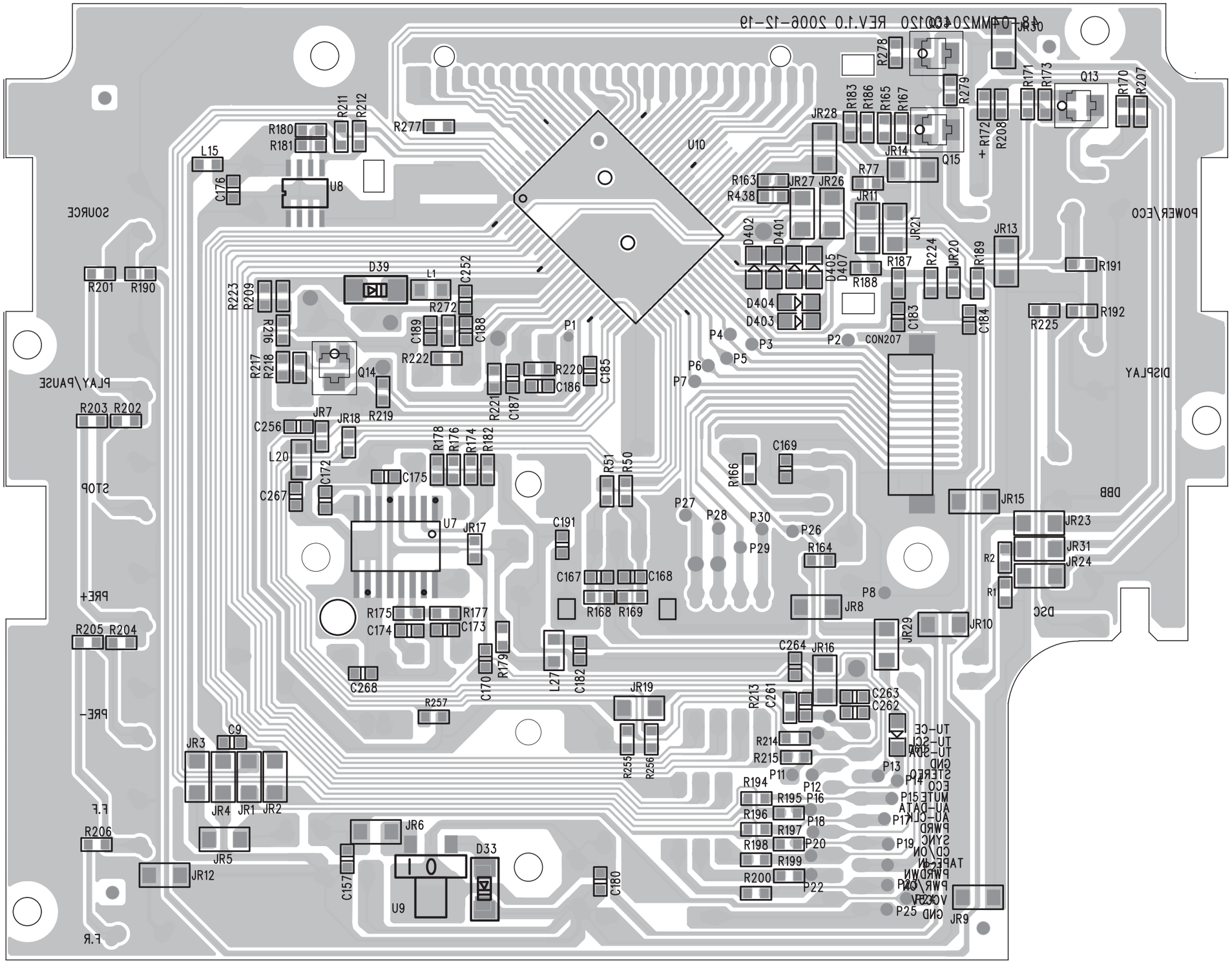
PCB LAYOUT - FRONT/MCU BOARD (TOP VIEW)



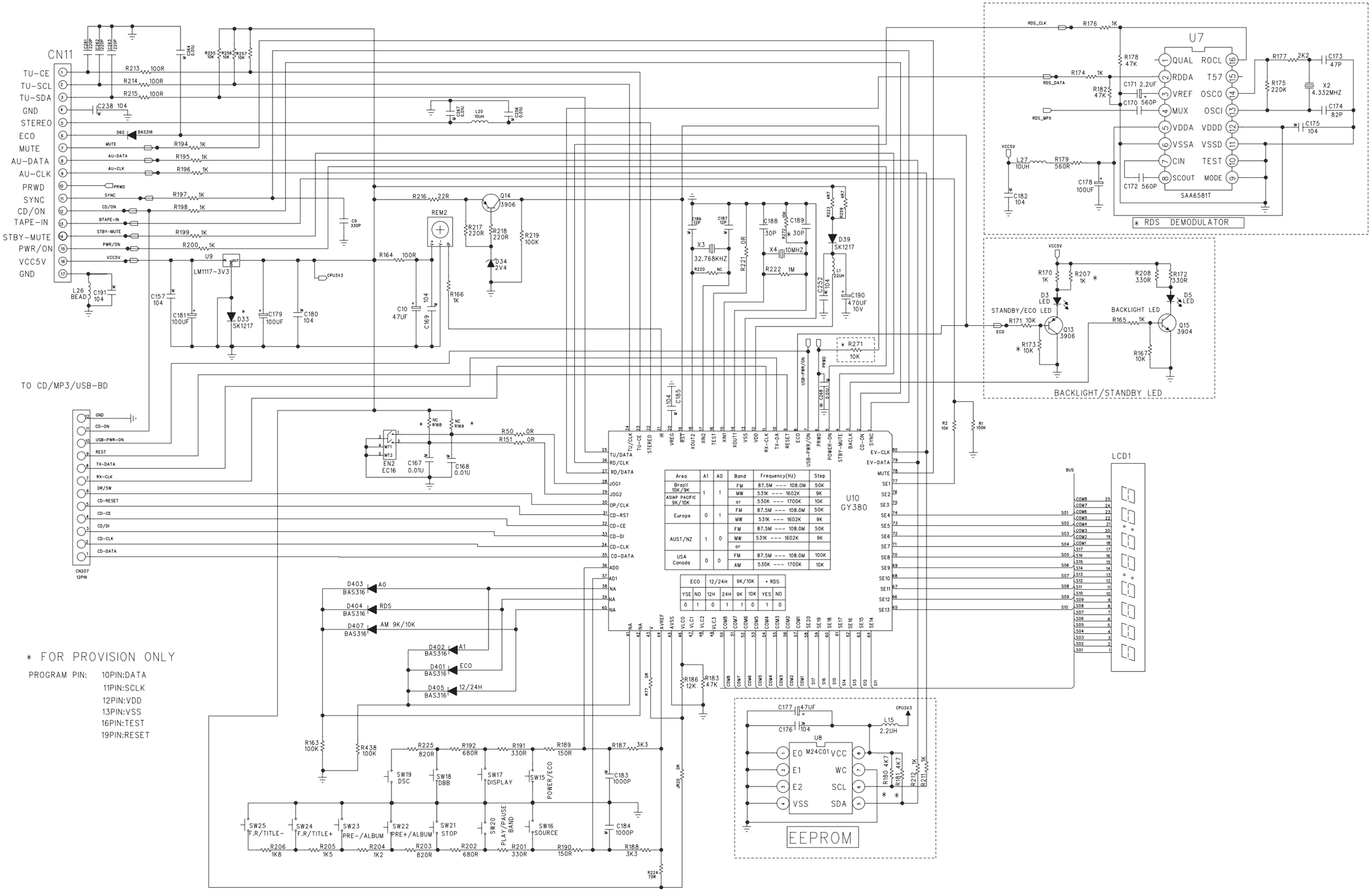
6-3

PCB LAYOUT - FRONT/MCU BOARD (BOTTOM VIEW)



6-4

CIRCUIT DIAGRAM - FRONT/MCU BOARD



Area	A1	A0	Band	Frequency(Hz)	Step
Brazil 10K/9K ASIAP PACIFIC 9K/10K	1	1	FM	87.5M --- 108.0M	50K
			MW	531K --- 1602K	9K
			or	530K --- 1700K	10K
Europe	0	1	FM	87.5M --- 108.0M	50K
			MW	531K --- 1602K	9K
AUST/NZ	1	0	FM	87.5M --- 108.0M	50K
			MW	531K --- 1602K	9K
			or		
USA Canada	0	0	FM	87.5M --- 108.0M	100K
			AM	530K --- 1700K	10K

ECO		12/24H		9K/10K		• RDS	
YSE	NO	12H	24H	9K	10K	YES	NO
0	1	0	1	1	0	1	0

7-1

CD MP3 BOARD

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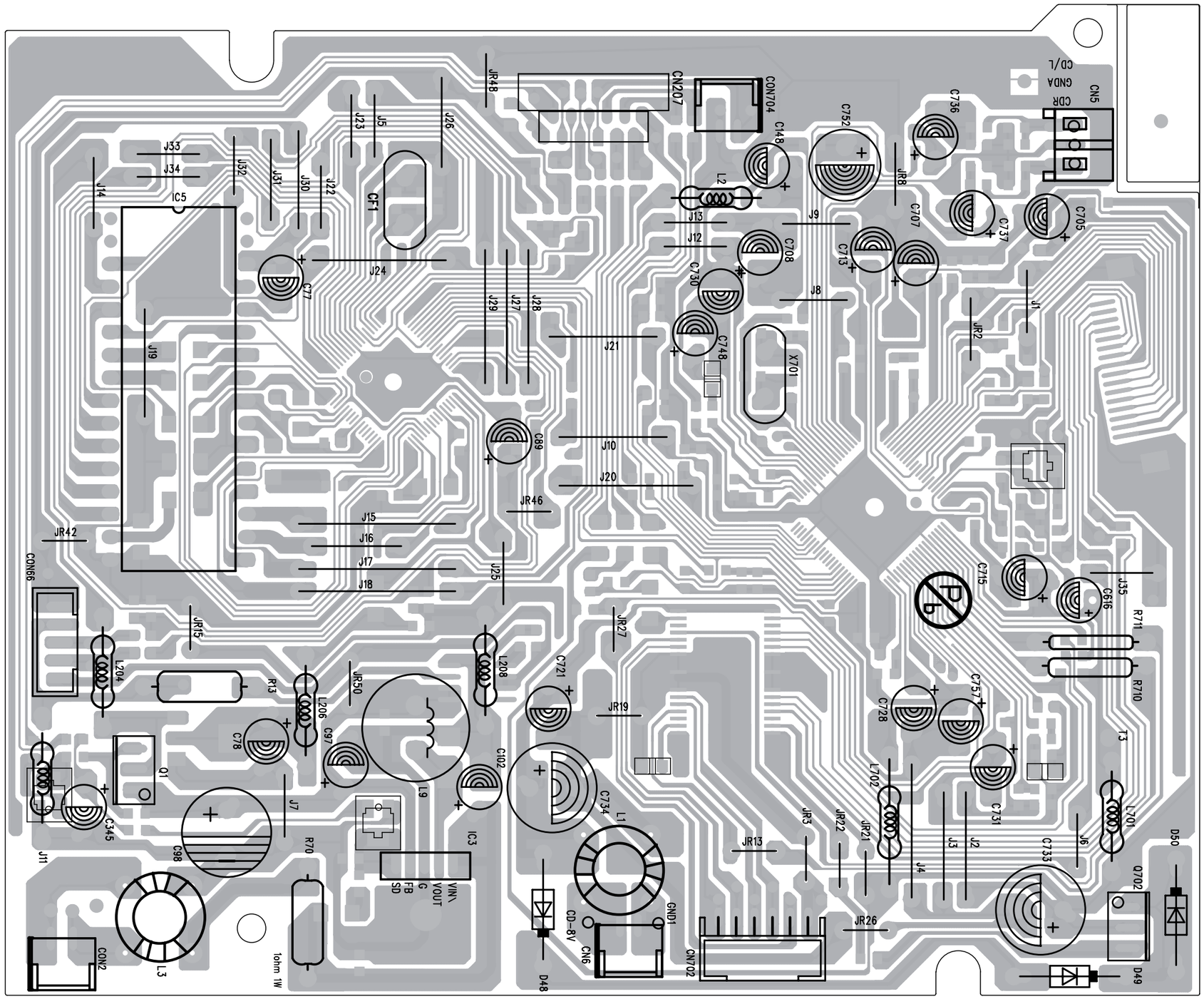
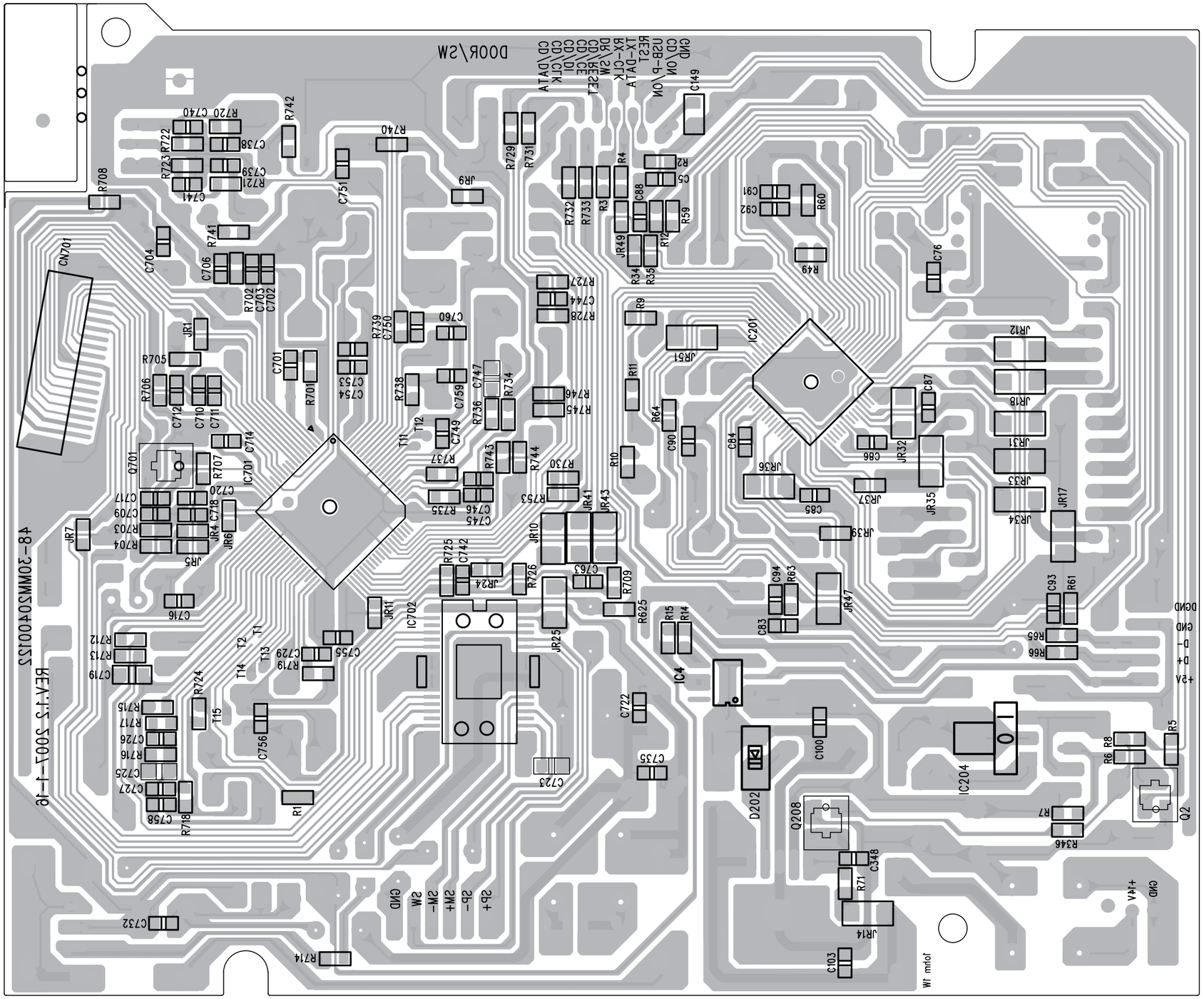
7-2

PCB LAYOUT - CD MP3 BOARD (TOP VIEW)



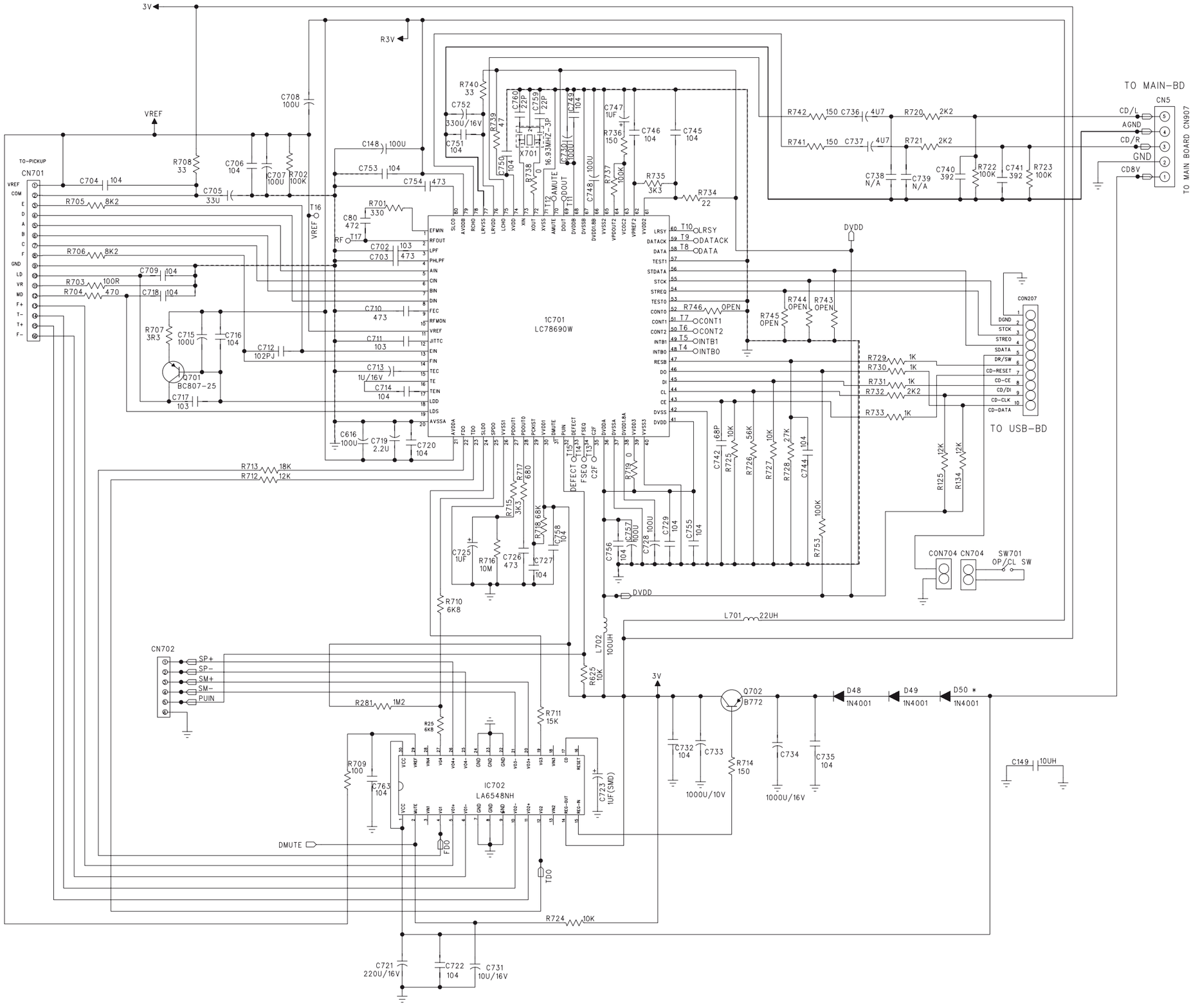
7-3

PCB LAYOUT - CD MP3 BOARD (BOTTOM VIEW)



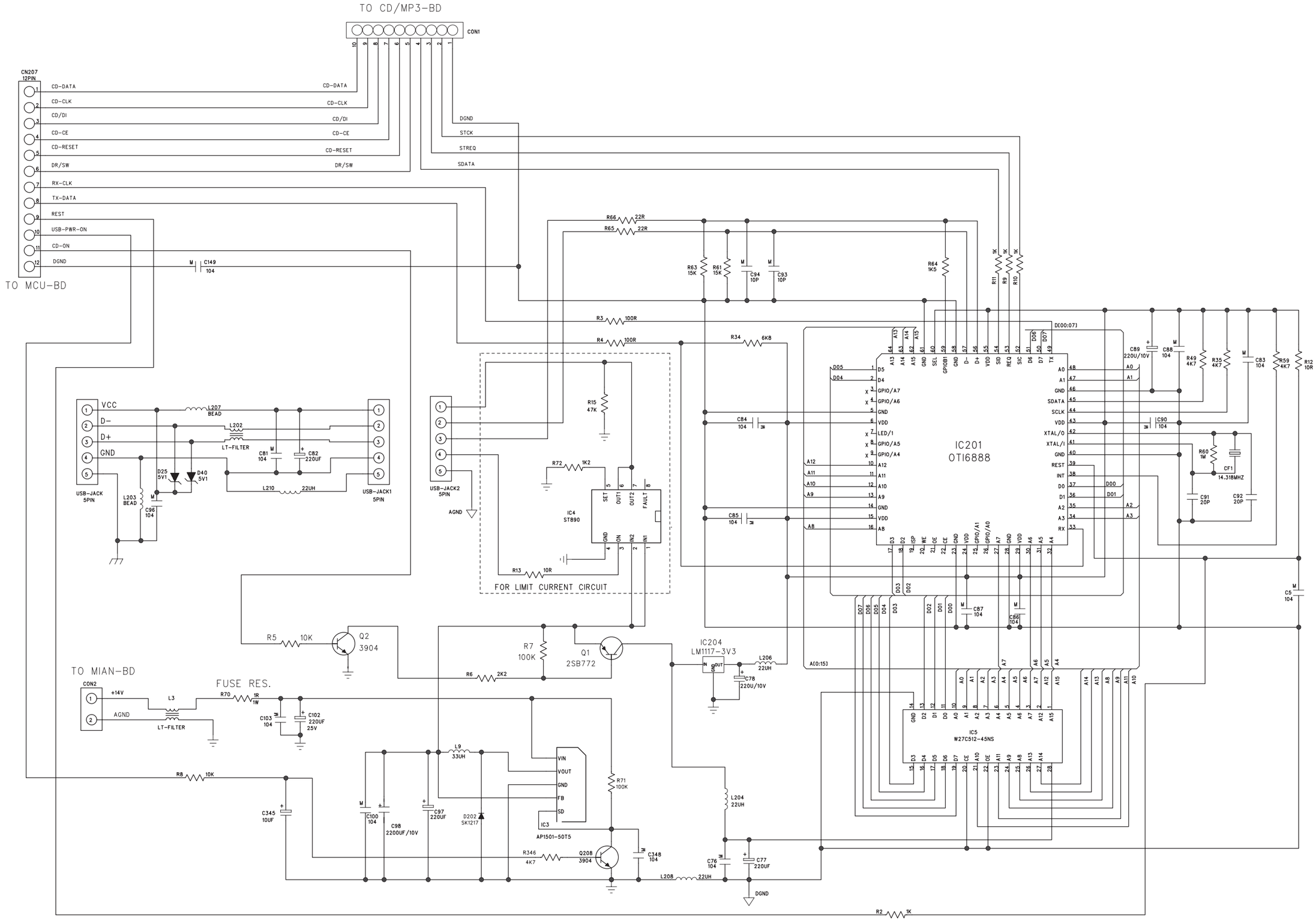
7-4

PCB LAYOUT - CD MP3 BOARD



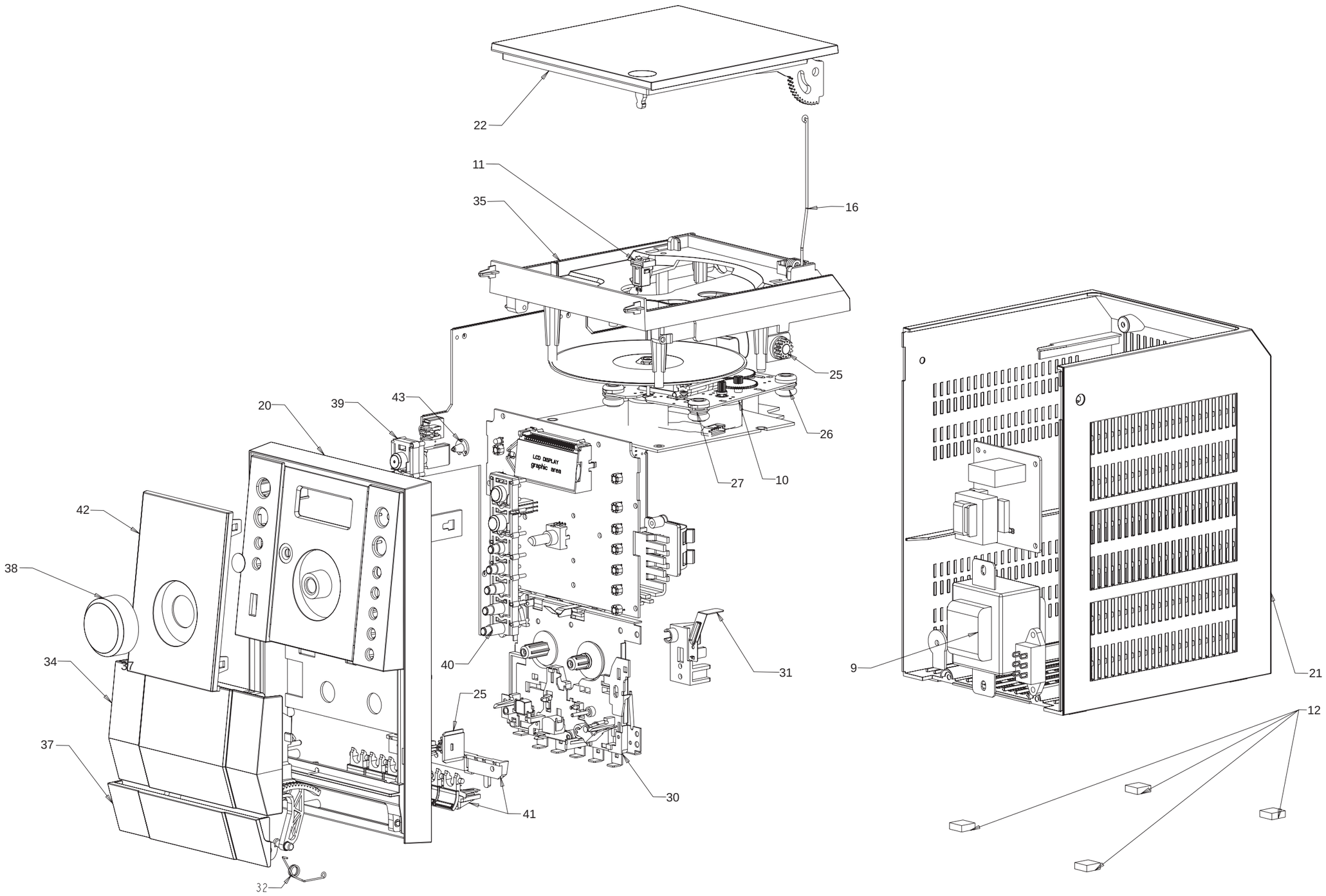
7-5

PCB LAYOUT - CD MP3 BOARD
USB PART



8-1

SET MECHANICAL EXPLODED VIEW



MECHANICAL & ACCESSORIES PARTS LIST

2	996510000877	SINGLE SPK BOX ASS'Y
9	⚠996510000902	TRANSFORMER 230V T08405A
10	994000005398	CD MECHANISM DA11B3VF
11	994000002354	CD DOOR SWITCH DLS-02-W-1
12	996510000904	RUBBER FOOT
16	996510000905	CD DOOR SPRING
20	996510000906	FRONT CABINET
21	996510000907	REAR CABINET
22	996510000908	CD DOOR
23	⚠996510000909	AC CORD VDE APP 2M /12
23	⚠996510000859	AC CORD BS APP 2M /05
24	996510000910	FM ANT SMF-01T-1.3 L=1.1M
25	994000001295	DAMPER GEAR ASS'Y
26	996510000911	CD DAMPER-BLACK
27	996510000912	CD DAMPER-GREY
28	996510000913	12P FFC CABLE 1mm L200mm
29	996510000914	17P FFC CABLE 1.25mm
30	996510000915	CASS DECK CS-21SC-820DTS
31	996510000916	RECORD ARM
32	996510000917	CASS SPRING
34	996510000919	CASSETTE DOOR
35	996510000920	CD TRAY
37	996510000921	CASS KEY DOOR
38	996510000922	VOL KNOB
39	996510000923	POWER BUTTON
40	996510000924	CONTROL KEYS
41	996510000925	CASS KEY WITH HOLDER
42	996510000926	DISPLAY LENS
43	996510000927	STANDBY LIGHT GUIDE
CN701	996510000903	16P FFC L=110mm

Note: Only these parts mentioned in the list are normal service parts.

ELECTRICAL PARTS LIST - MAIN BOARD

C16	994000001205	E.CAP 3300UF 35V +-20%	Q22	996510000878	TRANSISTORS SPD09P06PL
C220	994000004351	TRIMMER 20PF 6mm (RED)	Q23	994000005384	TRANSISTOR KTK161GR
C225	994000004351	TRIMMER 20PF 6mm (RED)	Q24	996500038609	TRANSISTOR 2W 8050C
C236	994000000254	TRIMMER 10PF 6mm (WH)	Q25	994000004338	TRANSISTOR PMBT3904
CF2	994000003642	CERAMIC FILTER LT10.7MA5-A	Q28	994000004338	TRANSISTOR PMBT3904
CF5	994000002857	CERAMIC FILTER SFU450B	Q32	994000004338	TRANSISTOR PMBT3904
CF6	996510000343	CER. DISCRIMINATOR JT10.7MG77	Q5	996500038609	TRANSISTOR 2W 8050C
CON3	994000004547	SPK JACK MSP-134V-05 LF	Q511	994000004338	TRANSISTOR PMBT3904
D51	994000004341	DIODE BAV99L	Q512	996500038609	TRANSISTOR 2W 8050C
D52	994000002836	VARICAP DIODE 1SV-149	Q7	994000004338	TRANSISTOR PMBT3904
D53	996510000879	VARACTOR DIODE SVC201SPA	Q8	994000001194	TRANSISTOR KSD882Y
D54	996510000879	VARACTOR DIODE SVC201SPA	Q9	996500038609	TRANSISTOR 2W 8050C
D55	994000002836	VARICAP DIODE 1SV-149	R55	⚠996510000883	FUSE RES. 0.47R 1/2W +-5%
D6	994000003938	RECTIFIER DIODE RL-202	SW201	994000004539	PUSH SWITCH PS-62 18PIN
D7	994000003938	RECTIFIER DIODE RL-202	T2	994000004356	I.F.T 7mm 7AC-249S0
D8	994000003938	RECTIFIER DIODE RL-202	T22	994000004357	I.F.T 7mm 7AL-272HM
D9	994000003938	RECTIFIER DIODE RL-202	T3	996510000886	AM ANT BLACK 7mm 7M4A1951X
F1	⚠994000000586	GLASS FUSE W/LEAD 3.15A/250V	U11	996510000881	IC TB2132FNG
IC1	996510000882	IC TFA9842BJ	U2	994000000253	IC KA7808E
IC2	996500039806	IC ET2314	U33	996510000880	IC LM78L08
IC505	994000004533	IC YD7312	U6	994000001357	IC LM78L05-AC
JACK1	994000004369	PHONE JACK TC38-063-05-01	USBJAC	996510000890	USB SOCKET 4P USB
JACK2	996510000889	PHONE JACK TC38-060-01 RING			
L19	996510000884	AXIAL INDUCTOR 100UH			
L2	996510000850	CHOKE COIL 8UH +-20%			
L207	996510000854	INDUCTOR 2.2UH-K CEC-2R2K			
L22	996510000885	CHOKE COIL 47UH			
L23	996510000885	CHOKE COIL 47UH			
L24	996510000850	CHOKE COIL 8UH +-20%			
L25	994000004538	I.F.T 10148BK7			
L28	996510000887	FM COIL 3x19.5T			
L29	996510000888	FM COIL 5x3.5T			
L3	996510000850	CHOKE COIL 8UH +-20%			
L30	996510000884	AXIAL IND. 100UH K CNCL-101K			
L31	996500039350	FM COIL 4.5x2.5T			
L32	996510000888	FM COIL 5x3.5T			
L33	996510000856	AXIAL IND. 470UH DCR=8.5R			
L4	996510000850	CHOKE COIL 8UH +-20%			
L8	994000003646	AXIAL IND. 10UH +-10% 500mA			
Q10	996500038609	TRANSISTOR 2W 8050C			
Q11	994000001193	TRANSISTOR KSB772YS			
Q12	994000004338	TRANSISTOR PMBT3904			
Q17	994000004338	TRANSISTOR PMBT3904			
Q18	994000004338	TRANSISTOR PMBT3904			
Q2	994000004338	TRANSISTOR PMBT3904			

Note: Only these parts mentioned in the list are normal service parts.

ELECTRICAL PARTS LIST - POWER & FRONT/MCU BOARD

C1	⚠	994000001225	SAFETY CAP 275V 0.22UF +-20%
D3		994000001234	LED LAMP 3mm LB304V3CB-2B/01
D5		996510000893	LED LAMP 3mm 1L034FV22G0CT001
F3		994000000585	CERAMIC FUSE W/LEAD T2A/250V
J7		994000003646	AXIAL IND. 10UH +-10% 500mA
J8		994000003646	AXIAL IND. 10UH +-10% 500mA
L1		996510000892	AC LINE FILTER 3mH 1A LFT20A-083
LCD1		996510000894	LCD DISPLAY SDH-DA1355-TN-1
Q13		994000003937	TRANSISTOR PMBT3906
Q14		994000003937	TRANSISTOR PMBT3906
Q15		994000004338	TRANSISTOR PMBT3904
Q31		996500038609	TRANSISTOR 2W 8050C
REM2		994000004367	OPTIC SENSER FM-6038TM2-5AN
RL1	⚠	996500039818	RELAY ME-7-006-HSL DC6V AC10A
SW15		994000001243	TACT SWITCH 160g
SW16		994000001243	TACT SWITCH 160g
SW17		994000001243	TACT SWITCH 160g
SW18		994000001243	TACT SWITCH 160g
SW19		994000001243	TACT SWITCH 160g
SW20		994000001243	TACT SWITCH 160g
SW21		994000001243	TACT SWITCH 160g
SW22		994000001243	TACT SWITCH 160g
SW23		994000001243	TACT SWITCH 160g
SW24		994000001243	TACT SWITCH 160g
SW25		994000001243	TACT SWITCH 160g
T23	⚠	996510000891	TRASFO. EI28 230V HF-V28B30
U10		996510000895	MCU GY380 (FLASH)
U8		994000001236	IC (SGS) M24C01-WMN6
U9		994000002839	IC LM1117S-3.3 SOT-223
X3		994000004615	CRYSTAL 32.768KHZ +-20PPM
X4		996500039820	CRYSTAL 10MHz 49/US

Note: Only these parts mentioned in the list are normal service parts.

ELECTRICAL PARTS LIST - CD MP3 BOARD

CF1	996510000899	CRYSTAL 14.318180 MHz
D202	996510000896	SCHOTTKY BARRIER DIODE SK1217
IC201	996510000897	IC OTI-6888G USB DECODER
IC204	994000002839	IC LM1117S-3.3 SOT-223
IC3	994000002447	IC AP1501-50T5 150KHz
IC5	996510000898	IC W27C512-45Z EPROM DIP28D-2
IC701	996500039807	IC (SANYO) LC78690NW-E
IC702	994000004622	IC (SANYO) LA6548NH HSOP28H
L2	996510000850	AXIAL INDUCTOR 22UH +-10%
L204	996510000900	AXIAL INDUCTOR 22UH +-10%
L206	996510000900	AXIAL INDUCTOR 22UH +-10%
L208	996510000900	AXIAL INDUCTOR 22UH +-10%
L701	996510000900	AXIAL INDUCTOR 22UH +-10%
L702	996510000855	AXIAL INDUCTOR 100UH +-10%
L9	996510000901	CHOKE COIL 33UH +-10% 3A
Q1	994000004145	TRANSISTOR B772Y
Q2	994000004338	TRANSISTOR PMBT3904
Q208	994000004338	TRANSISTOR PMBT3904
Q702	994000004145	TRANSISTOR B772Y
R70	⚠ 994000004478	FUSE RESISTORS 1R 1W +-5%
X701	994000004551	CRYSTAL 16.9344MHZ +-20PPM

Note: Only these parts mentioned in the list are normal service parts.

REVISION LIST

1.0 Manual 3141 785 31320

Initial Service Manual released.

1.1 Manual 3141 785 31321

In this version,

1) the instruction of CD playability check is added.

2) Chapter 3 to Chapter 7 have been revised according to latest diagrams.